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<b>STATIONARY SOURCE COMPLIANCE DIVISION</b>	<b>APPL NO</b> 510975/979	<b>DATE</b> 8/17/10
<b>PERMIT APPLICATION PROCESSING AND CALCULATIONS</b>	<b>PROCESSED BY</b> TK	<b>CHECKED BY</b>

### **Applicant**

Waste Management Recycling and Disposal Services of California  
9081 Tujunga Avenue, 2<sup>nd</sup> Floor  
Sun Valley, CA 91352

### **Equipment Location**

Bradley Landfill  
9227 Tujunga Avenue  
Sun Valley, CA

### **Equipment Description**

#### **A/N 510975 (Previous 437561, R-395061)**

RESOURCE RECOVERY SYSTEM NO. 1 CONSISTING OF:

1. INTERNAL COMBUSTION ENGINE NO. 1, DEUTZ, MODEL TBG 620 V16K, SIXTEEN CYLINDER, 1877 BHP, LEAN BURN, LANDFILL GAS FIRED, TURBOCHARGED AND AFTERCOOLED, DRIVING A 1.3 MW ELECTRICAL GENERATOR.
2. COMPRESSOR, 2500 SCFM, 275 HP (COMMON TO A/N 510975, 510976, 510977, 510978 AND 510979 ).
3. COMPRESSOR, STANDBY, 600 SCFM
4. RADIATOR WITH FANS.
5. ANCILLARY SKID WITH A MUFFLER, HEAT EXCHANGER, FILTER, INTERCOOLER AND EXHAUST STACK.

#### **A/N 510976 (Previous 437562, R-395063)**

RESOURCE RECOVERY SYSTEM NO. 2 CONSISTING OF:

1. INTERNAL COMBUSTION ENGINE NO. 2, DEUTZ, MODEL TBG 620 V16K, SIXTEEN CYLINDER, 1877 BHP, LEAN BURN, LANDFILL GAS FIRED, TURBOCHARGED AND AFTERCOOLED, DRIVING A 1.3 MW ELECTRICAL GENERATOR.

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2. COMPRESSOR, 2500 SCFM, 275 HP (COMMON TO A/N 510975, 510976, 510977, 510978 AND 510979 ).
3. COMPRESSOR, STANDBY, 600 SCFM
4. RADIATOR WITH FANS.
5. ANCILLARY SKID WITH A MUFFLER, HEAT EXCHANGER FILTER, AND EXHAUST STACK.

**A/N 510977 (Previous 437563, R-395064)**

RESOURCE RECOVERY SYSTEM NO. 3 CONSISTING OF:

1. INTERNAL COMBUSTION ENGINE NO. 3 DEUTZ, MODEL TBG 620 V16K, SIXTEEN CYLINDER, 1877 BHP, LEAN BURN, LANDFILL GAS FIRED, TURBOCHARGED AND AFTERCOOLED, DRIVING A 1.3 MW ELECTRICAL GENERATOR.
2. COMPRESSOR, 2500 SCFM, 275 HP (COMMON TO A/N 510975, 510976, 510977, 510978 AND 510979 ).
3. COMPRESSOR, STANDBY, 600 SCFM
4. RADIATOR WITH FANS.
5. ANCILLARY SKID WITH A MUFFLER, HEAT EXCHANGER, FILTER, AND EXHAUST STACK.

**A/N 510978 (Previous 437564, R-395065)**

RESOURCE RECOVERY SYSTEM NO. 4 CONSISTING OF:

1. INTERNAL COMBUSTION ENGINE NO. 4, DEUTZ, MODEL TBG 620 V16K, SIXTEEN CYLINDER, 1877 BHP, LEAN BURN, LANDFILL GAS FIRED, TURBOCHARGED AND AFTERCOOLED, DRIVING A 1.3 MW ELECTRICAL GENERATOR.
2. COMPRESSOR, 2500 SCFM, 275 HP (COMMON TO A/N 510975, 510976, 510977, 510978 AND 510979 ).

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3. COMPRESSOR, STANDBY, 600 SCFM
4. RADIATOR WITH FANS.
5. ANCILLARY SKID WITH A MUFFLER, HEAT EXCHANGER FILTER, AND EXHAUST STACK.

**A/N 510979 (Previous 437565, R-407403)**

**RESOURCE RECOVERY SYSTEM NO. 5 CONSISTING OF:**

1. INTERNAL COMBUSTION ENGINE NO. 5, DEUTZ, MODEL TBG 620 V16K, SIXTEEN CYLINDER, 1877 BHP, LEAN BURN, LANDFILL GAS FIRED, TURBOCHARGED AND AFTERCOOLED, DRIVING A 1.3 MW ELECTRICAL GENERATOR.
2. COMPRESSOR, 2500 SCFM, 275 HP (COMMON TO A/N 510975, 510976, 510977, 510978 AND 510979 ).
3. COMPRESSOR, STANDBY, 600 SCFM
4. RADIATOR WITH FANS.
5. ANCILLARY SKID WITH A MUFFLER, HEAT EXCHANGER FILTER, AND EXHAUST STACK.

**History**

The Bradley landfill is a closed Class III landfill. The gas generated by the landfill is collected and partially flared. The applicant uses some of the gas to fuel five engines which drive generators to produce electricity. The total landfill gas flow rate to the three flares is 9722 scfm (#1 is 5556scfm, #2 is 2083 scfm and #3 is 2083 scfm). Approximately 2500 scfm is used as fuel for the engines. The facility is a Title V facility. These applications were submitted to install a 2500 scfm compressor, common to all five engines and to place the individual 600 scfm compressors as standby.

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## Process Description

A portion of the landfill gas, which is collected by the existing collection system at this facility, is used to fuel five internal combustion engines and drive electrical generators in the production of electricity. Initially, each engine was fueled with a 600 scfm landfill gas compressor. A common 2500 scfm compressor will be installed to fuel all five engines. The individual 600 scfm compressors will operate in the standby mode. Each engine/generator produces 1.3 MW of power. As the landfill gas generation rate decreases and there is insufficient landfill gas to make the project viable to operate, the landfill gas to energy systems will be removed.

## Calculations

There will be no increase in emissions from this modification.

Calculations are from previous evaluation.

Each engine is rated at 1877 bhp with 607.1 scfm landfill gas flow rate at 45.7% methane.

Heating rate (with applicant's requested 5% safety factor):

$5 \times 1877 \text{ bhp} \times 2547 \text{ btu/bhp-hr} \times 1/0.29 \times 1.05 = 87 \text{ MM btu/hr}$

$5 \times 607.1 \text{ scfm} \times 60 \text{ min/hr} \times 1000 \text{ btu/cft} \times 0.457 \times 1.05 = 87 \text{ MM btu/hr}$

or 17.5 MM btu/hr each.

Source Test Results (lbs/hr):

S/T date 5/26/10.

	Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
ROG	0.50	0.49	0.58	0.55	0.50
NOx	1.81	1.89	1.57	1.63	1.55
SOx	0.15	0.15	0.27	0.26	0.26
CO	8.83	8.15	8.88	8.59	8.51
PM10	0.0306	0.0296	0.0310	0.0265	0.0269

S/T shows compliance.

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Emissions from **each** engine:

ROG (based on R1150.1 limit of 20 ppm Hexane @3% O<sub>2</sub>)

$$= 20 \text{ ppmv} \times 86 \text{ lbs/379 cft} \times 60 \text{ min/hr} \times 4041 \text{ dscfm} \times (21-6.64/21-3)$$

$$= 0.87 \text{ lbs/hr}$$

$$= 21 \text{ lbs/day}$$

$$0.87 \text{ lb/hr} / \text{lb/454 gr} \times 1877 \text{ bhp} = 0.21 \text{ gr/bhp-hr}$$

$$\text{BACT is } 0.8 \text{ gr/bhp-hr}$$

S/T was 0.58 lbs/hr and 13.83 ppmv Hexane @3% O<sub>2</sub>.

P/C was **1.65 lbs/hr**

NO<sub>x</sub> (based on BACT of 0.6 gr/bhp-hr)

$$= 1877 \text{ bhp} \times 0.60 \text{ gr/bhp-hr} \times \text{lb/454 gr}$$

$$= \mathbf{2.48 \text{ lbs/hr}}$$

$$= 59.5 \text{ lbs/day}$$

S/T was 1.89 lbs/hr

P/C was 2.48 lbs/hr

SO<sub>x</sub> (based on Rule 431.1 limit of 150 ppm as H<sub>2</sub>S)

$$= 150 \text{ ppm} \times 540 \text{ cft/min} \times 60 \text{ min/hr} \times 34 \text{ lb H}_2\text{S/379 cft} \times 64 \text{ lb SO}_2/34 \text{ lbs H}_2\text{S}$$

$$= \mathbf{0.82 \text{ lbs/hr}}$$

$$= 19.7 \text{ lbs/day}$$

S/T was 0.27 lbs/hr

P/C was 0.82 lbs/hr

CO (based on guarantee of 2.4 gr/bhp-hr, BACT is 2.5 gr/bhp-hr)

$$= 1877 \text{ bhp} \times 2.4 \text{ gr/bhp-hr} \times \text{lb/454 gr}$$

$$= \mathbf{9.92 \text{ lbs/hr}}$$

$$= 238 \text{ lbs/day}$$

S/T was 8.88 lbs/hr

P/C was 9.92 lbs/hr

PM<sub>10</sub> (based on guarantee of 0.05 gr/bhp-hr)

$$= 1877 \text{ bhp} \times 0.05 \text{ gr/bhp-hr} \times \text{lb/454 gr}$$

$$= \mathbf{0.21 \text{ lb/hr}}$$

$$= 5 \text{ lb/day}$$

S/T was 0.031 lbs/hr

P/C was 0.21 lbs/hr

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## Evaluation

Rule 212:

There is no emission increase from this modification. Therefore, a public notice is not required.

Rule 401: Visible emissions are not expected.

Rule 402: Nuisance is not expected.

Rule 404:  $PM_{10} = (0.21 \text{ lbs/hr} \times 7000 \text{ gr/lb}) / (4146 \text{ dscfm} \times 60 \text{ min/hr})$   
 $= 0.006 \text{ gr/dscf}$   
Allowable = 0.112 gr/dscf  
Equipment is in compliance.

Rule 431.1 Equipment is expected to meet the 150 ppmv H<sub>2</sub>S limit.

Rule 1110.2:

	Limits	Actual (@15%O <sub>2</sub> )
NO <sub>x</sub>	36 PPM	28.24 PPM
VOC	40 PPM	27.38 PPM
CO	2000 PPM	216.74 PPM

Rule 1150.1: Equipment is expected to meet NMOC outlet concentration of 20 ppm (dry, as hexane @ 3% O<sub>2</sub>) or 98% destruction efficiency.

Reg XIII: Facility is a major source. Therefore, LAER is applicable. However, there will be no emission increase as a result of the proposed modification. This equipment met the LAER emission limits at the time when the permit to construct was issued to the engine. The following emission limits meet LAER.

VOC complies with BACT (0.8 gr/bhp-hr).  
NO<sub>x</sub> complies with BACT (0.6 gr/bhp-hr).  
SO<sub>x</sub> proposed 150 ppmv. No BACT limit.  
CO complies with BACT (2.5 gr/bhp-hr).  
PM<sub>10</sub> proposed 0.05 gr/bhp-hr. No BACT limit.

Modeling:

Per Table A-1, NO<sub>x</sub> allowable emissions = 0.86 lbs/hr (2.48 lbs/hr actual). Therefore, modeling for NO<sub>x</sub> was performed and showed compliance with AQMD rules and

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regulations. NOx was below California and Federal standards. Modeling does not need to be revised since there is no emission increase.

**CEQA:**

A Notice of Exemption has been submitted by the City of Los Angeles Department of City Planning dated 3/25/02. A new CEQA is not required.

**Rule 1401: Toxic Risk Assessment:**

The toxic risk has been evaluated and the results showed 3.09 in a million (0.62 in a million from each of the four engines and 0.64 in a million from the fifth engine). Toxic Risk Assessment does not need to be revised since there is no emission increase.

**Reg XXX: Title V Permits**

The engines are a major source and the facility was issued a Title V permit on March 27, 2007. The modification is considered a minor permit revision. Therefore, a 45 day EPA review is required prior to issuance of the permit.

**40CFR Part 63 – Subpart zzzz**

63.6585 - Applicability: These engines are stationary reciprocating internal combustion engines (RICE) located at area source of HAP.

63.6590 (a)(1)(iii) – Existing RICE (engines built before 2006) operating at an area source of HAP.

63.6603 (a) – Existing RICE at an area source of HAP must comply with Table 2d and operating limits of Table 2b.

Table 2d: Non-emergency , non black start landfill/digester gas fired stationary RICE must change oil filter, inspect spark plugs, hoses and belts every 1440 hours of operation or annually, whichever comes first, or replace as necessary. Compliance can be expected.

Table 2b: No operating limits for this engine.

**Conclusions and Recommendations**

This project is expected to comply with all applicable AQMD rules and regulations. Recommend issuing a permit to construct to the five Resource Recovery Systems with a revised TV permit.